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(54) Transport system with suspended load and lifting and lowering devices on board

(57) Transport system with suspended load and lifting and lowering devices on board; characterised as it consists of: an elevated guide rail (1) which is totally horizontal, a motorised carriage (2) which moves longitudinally along a guide rail (1), a system to suspend the load (7) from the carriage (1) and a system to adjust the height of the load (7) at different stretches of the run; the system is controlled by a programmable robot.

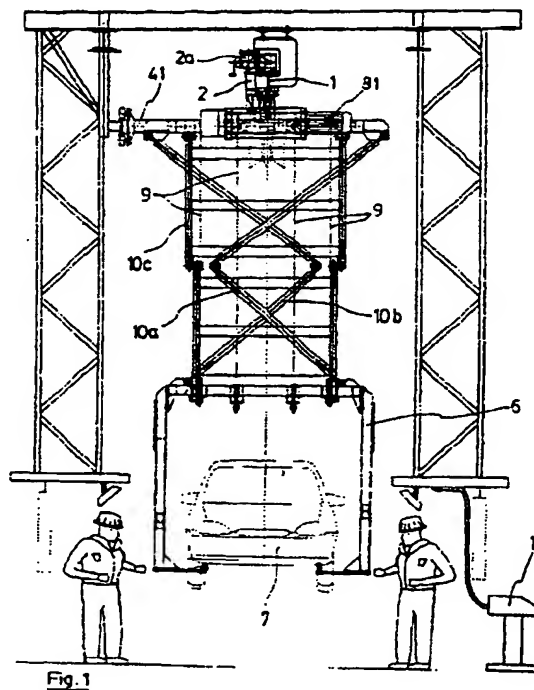


Fig. 1

EP 0 963 904 A1

## Description

### PURPOSE OF THE INVENTION

[0001] This transport system with suspended load and lifting and lowering devices on board, consists of a mounted motorised carriage which can move on an elevated horizontal guide rail, an upper suspended frame of the carriage, a lower support to grip the load, and elevation systems which, apart from connecting the lower support with the upper frame, enable it to be placed at the required height together with the load, at different stretches of the run.

### BACKGROUND OF THE INVENTION

[0002] The transport systems with suspended load, used particularly in assembly lines, consist of a guide rail on which a motorised carriage is mounted from which a chassis suspends at a set height and used to support the load to be transported.

[0003] In these assembly lines, there are different working zones and it is required that the load is placed at a certain height in each of these zones to enable the operators to work correctly. This is achieved by moving the carriage on elevated guide rails which run in horizontal stretches at different heights, and sloping inter-link stretches.

[0004] To move the carriage on the sloping stretches of the guide rail causes serious traction problems with the possibility of the drive wheels slipping, making it difficult to go along these stretches, especially when heavy loads are being transported.

[0005] If the dimensions of the load vary, the guide rails have to be modified so that the load passes through different working zones at set heights.

### DESCRIPTION OF THE INVENTION

[0006] The transport system of this invention includes mounting the motorised carriage on an elevated guide rail, which is different as it is horizontal throughout the run, without any sloping stretches. The motorised carriage moves on the horizontal guide rail and carries a system to support the load and systems to adjust the height in the various working zones.

[0007] The system is controlled by a programmable robot which sets the position of the carriage at all times and enables the height of the load to be adjusted in the various working zones, depending on the dimensions of the load and the type of work being performed by the operators in each of these zones.

[0008] The advantages of this system are: the elimination of sloping stretches in the elevated guide rail, thereby eliminating traction problems, the possibility of adjusting the load height without the need to change or modify the elevated guide rail and the possibility of resetting the course of the load at different stretches of

the run, by means of the robot.

### DESCRIPTION OF THE DIAGRAMS

#### [0009]

- Figure 1 shows a front view of a vehicle assembly line with the transport system of the invention.

10 - Figure 2 shows details, in a larger scale, of the upper section of the transport system given in the previous figure.

15 Figure 3 shows an side view of the transport system, showing the load in the lower position and in an elevated position.

Figure 4 shows details, in a larger scale, of the upper section of the transport system given in the previous figure.

#### 20 PREFERENTIAL MANUFACTURE OF THE INVENTION

[0010] This transport system consists of a longitudinal guide rail (1) placed on a horizontal plane, on which a motorised carriage (2) is mounted with the possibility of moving and from which an upper frame (4) suspends by means of shafts (3).

25 [0011] The frame (4) has a side arm (41) provided with wheels (42) which act with a small clearance on a stabilising guide rail (5) parallel to the upper guide rail (1). This stabilising guide rail (5) is only installed in zones where the load has to be handled.

30 [0012] A device is fixed to the frame (4) to elevate the lower support (6) used to hold the load (7) which is to be transported, which in this example is represented by the chassis of a vehicle. The elevation system of the support (6) consists of a drum (8) which turns in both directions by a servomotor (81). Depending on the turn direction of the motor (81) steel cables (9) are wound or unwound round the drum (8). These cables hold the lower support (6) thereby lifting or lowering the support (6) and therefore the load (7) which is placed on the support.

35 [0013] The lower support (6) is connected to the upper frame (4) by scissoring mechanisms, also called pantographic mechanisms. (10a), (10b) and (10c) which allow the lower support (6) to vertically move with respect to the frame (4).

40 [0014] The scissoring mechanisms (10a) and (10b) are placed in opposite positions and work on parallel planes, while the scissoring mechanism (10c) works on a plane perpendicular to the two previous ones.

45 [0015] This lay-out of the scissoring mechanisms (10a), (10b) and (10c) stops the lower support (6) from swinging with respect to the upper frame (4).

50 [0016] The motor (2a) used to longitudinally move the carriage (2) and the motor (81) used to operate the drum (8) will be furnished with encoders, allowing the

position to be controlled at all times, by means of a programmable robot (11). This robot can also programme changes in height of the support (6) and therefore the load to be transported (7) at the different points of work defined along the assembly line.

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### Claims

1. Transport system with suspended load and lifting and lowering devices on board; characterised as it consists of: an elevated guide rail (1) which is totally horizontal, a motorised carriage (2) which moves longitudinally along a guide rail (1), a system to suspend the load (7) from the carriage (1) and a system to adjust the height of the load (7) at different stretches of the run; the system is controlled by a programmable robot. 10 15
2. A system, according to the previous claim, characterised because the system to suspend the load (7) from the moveable carriage consists of an upper frame (4) and a lower support (6) connected by scissoring mechanisms (10a, 10b, 10c) which enable the lower support (6) to be lifted and lowered with respect to the upper frame (4). 20 25
3. A system, according to the previous claims, characterised because the upper frame (4) is fixed to the carriage by means of horizontal shafts (3). 30
4. A system, according to the previous claims, characterised because the frame (4) has a side arm (41) furnished with wheels (42) which act with a small clearance on a stabilising guide rail (5). 35
5. A system, according to claim 1, characterised because the load elevation system consists of a rotating drum (8) mounted on the frame (4) and a motor (81) which rotates the drum (8) in both directions and winds or unwinds cables (9) which hold the lower support (6). 40
6. A system, according to the previous claims, characterised because the scissoring mechanisms (10c and 10a) are placed on perpendicular planes to stop the support (6) from swinging with respect to the frame (4). 45

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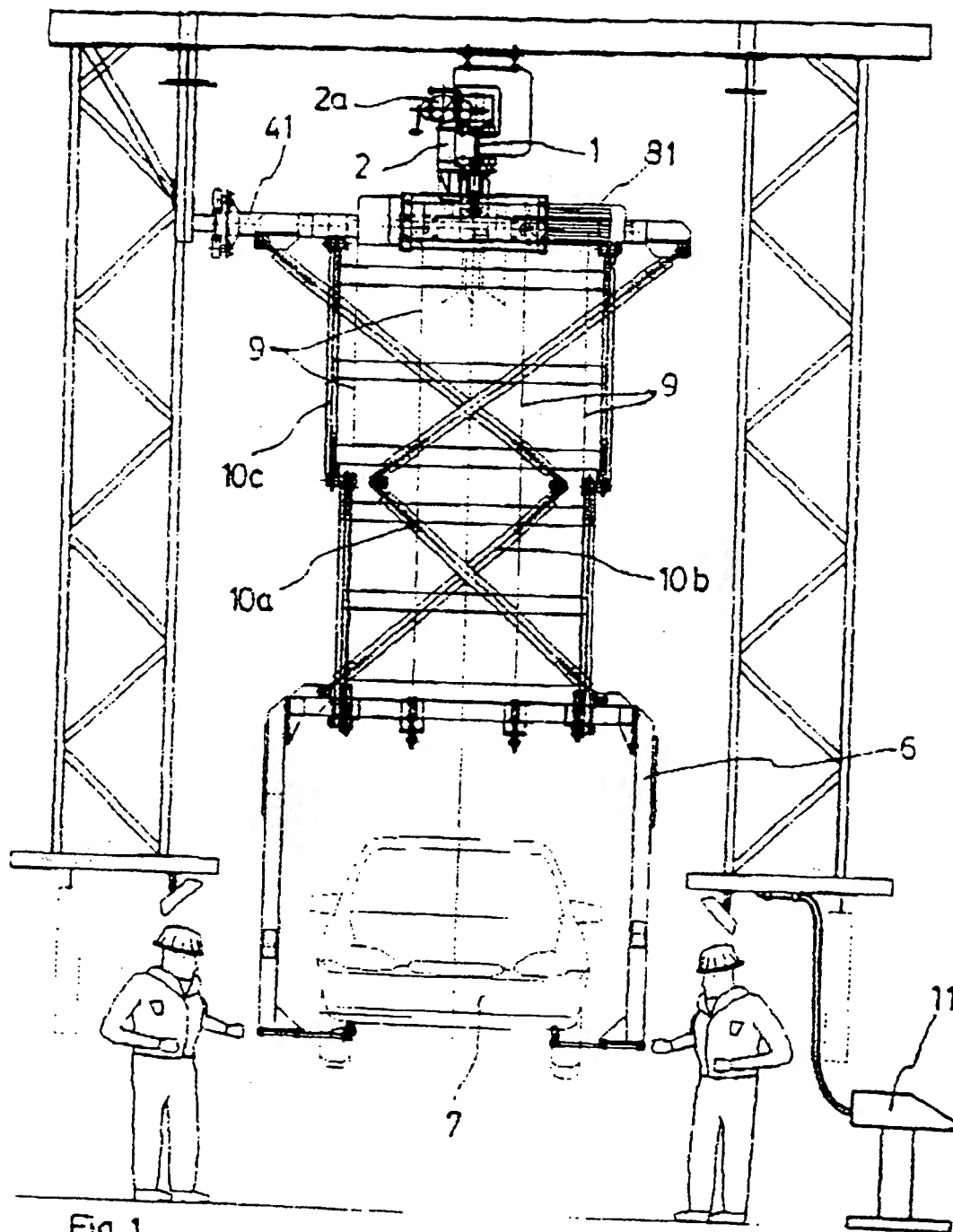


Fig. 1

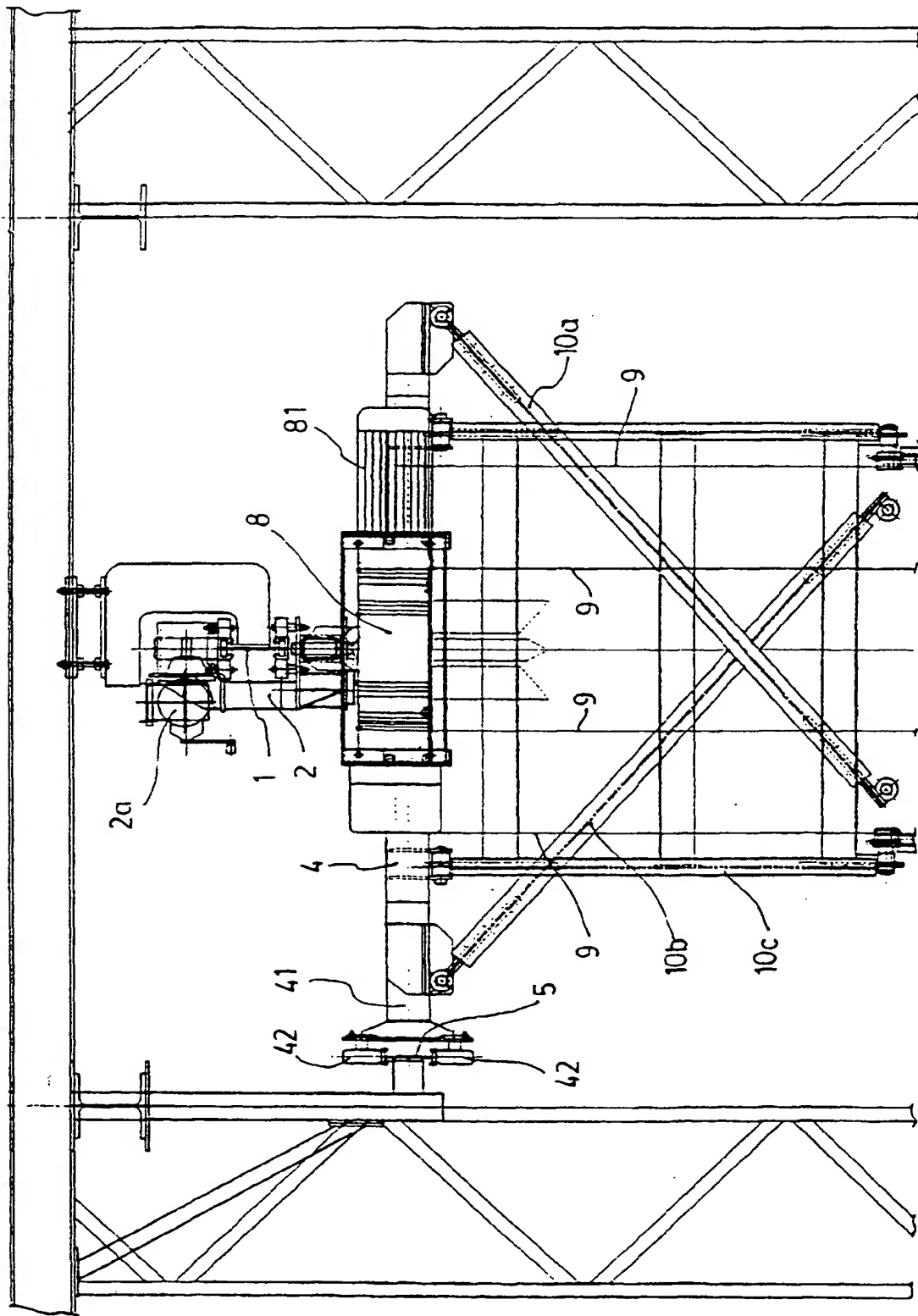


Fig. 2

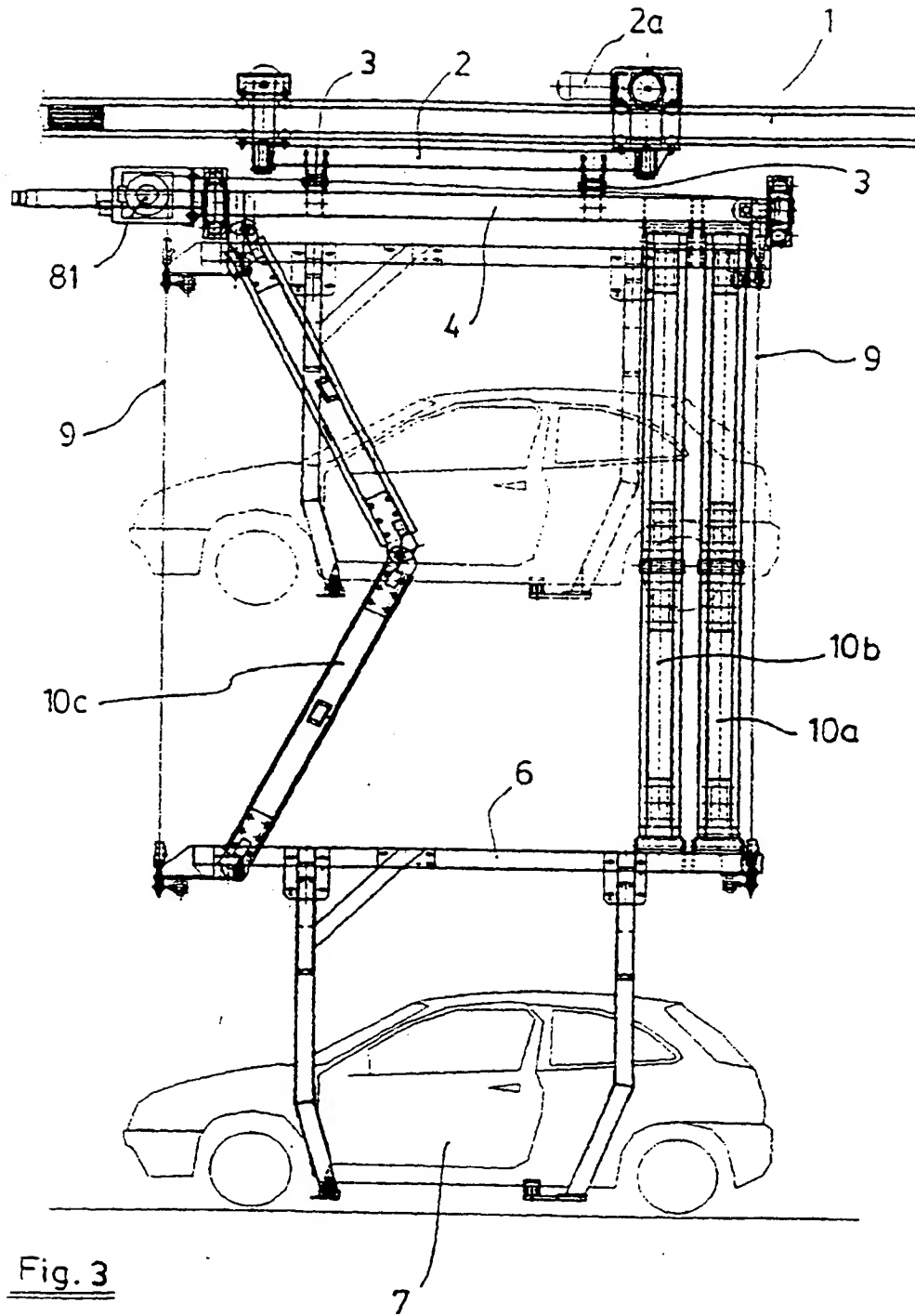


Fig. 3

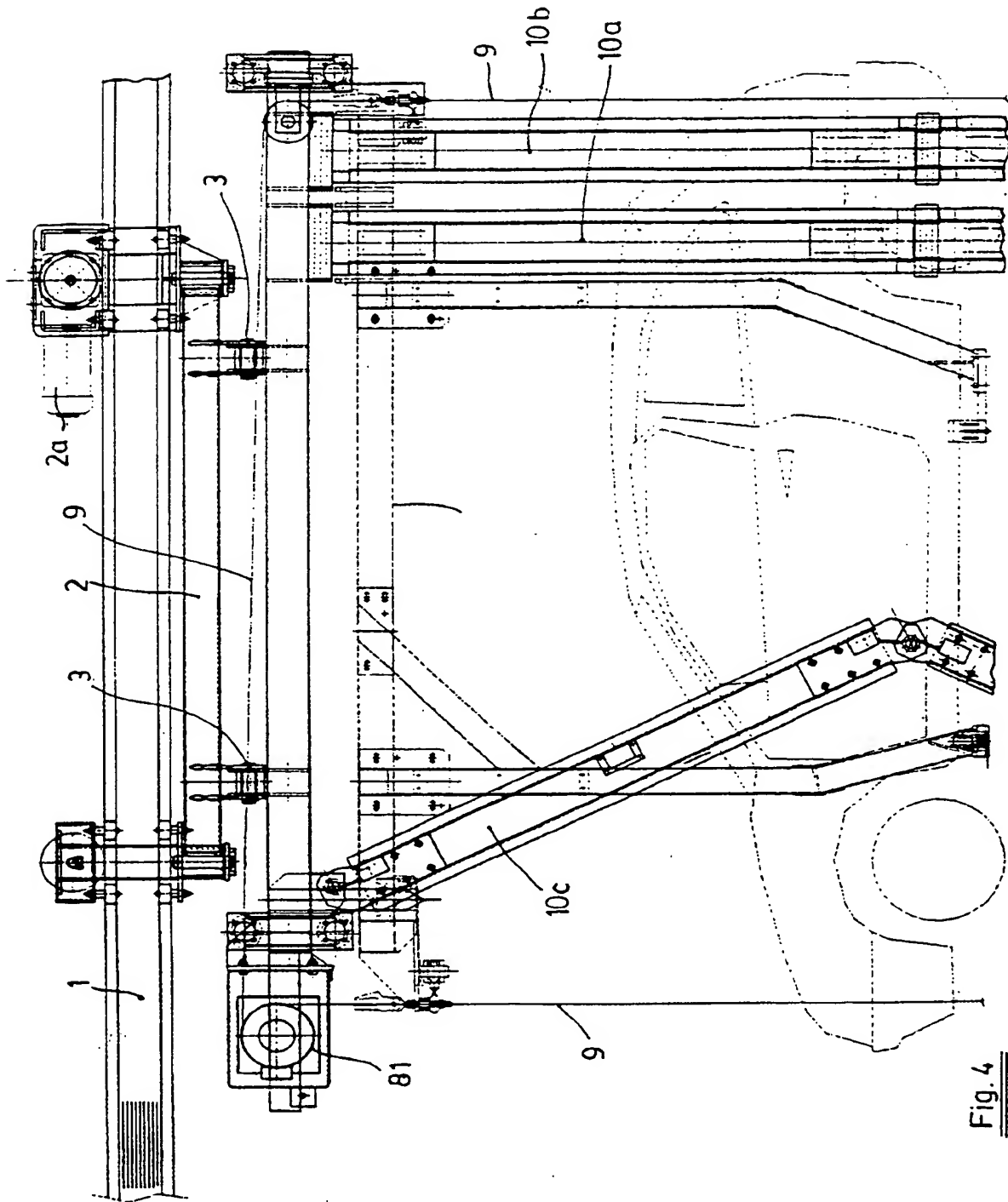


Fig. 4



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## EUROPEAN SEARCH REPORT

Application Number  
EP 98 20 1938

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	DE 43 26 563 A (TRACKSDORF RAINER F) 9 February 1995 * the whole document *	1	B62D65/00
Y	-----	2,5	
Y	"VEHICLE ASSEMBLY APPARATUS" RESEARCH DISCLOSURE, no. 333, 1 January 1992, pages 56-58 1 - 02, XP000281161 * the whole document *	2,5	
A	DE 94 16 172 U (NEUERO TECHNOLOGY GMBH) 15 December 1994 * page 6, paragraph 3; figure 1 *	4	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B62D B60S B66F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 4 November 1998	Examiner Smeyers, H
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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